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SEPTEMBER 14, 1987

CHEMICAL & ENGINEERING

NEWS

Scientific news from the ACS meeting in New Orleans

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CHEMICAL & ENGINEERING
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News of the Week

■ **International experts meeting in Geneva make progress toward reaching agreement on reducing nitrogen oxides emissions into the atmosphere.** **Page 4**

■ **Presidential AIDS commission met for first time last week, amid much controversy about Administration's efforts to combat the disease.** **Page 5**

■ **GAF chairman Samuel Heyman proposes management-led buyout of the specialty chemicals and building products company in deal that is worth about $2.3 billion.** **Page 5**

■ **Increased cancer risk in Marines is linked to Vietnam war service in study conducted by Veterans Administration.** **Page 6**

■ **Chemistry is key factor for U.S. to meet challenge of foreign competitors in technology for information systems, says new report.** **Page 6**

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Government

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Technology

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Science

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ACS News

Photographic album of society's national meeting in New Orleans shows wide variety of activities. **Page 28**

Cover: Scientists at USDA Forest Products Laboratory test ability of white rot fungus to degrade pentachlorophenol in soil

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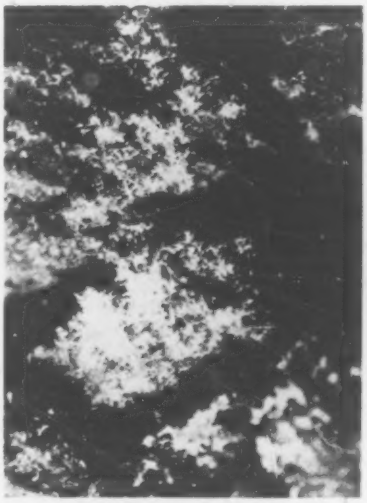


Cover Story

ACS meeting symposium on emerging detoxification technologies unveils promising use of white rot fungus in treatment of organic hazardous waste. **Page 17**

Chemical Productivity Growth Slows in Second Quarter

William J. Storck, C&EN New York

Growth of the U.S. chemical industry's productivity slowed down in the second quarter from the three previous quarters. However, it's too early to panic. It's nevertheless worrisome, as the second quarter normally exhibits stronger productivity growth than does the first quarter, with a seasonal slowdown coming in the third quarter of the year.

Also troublesome is that productivity (output per hour) for chemicals and allied products grew more slowly in the second quarter than did productivity for all manufacturing industries (including the chemical industry) on a quarter-to-quarter basis and almost equaled growth in the manufacturing sector on an annual basis. Unit labor costs (production wages per unit of output) for chemicals actually rose in the second quarter from the first as they continued to fall for all manufacturing. On an annual basis, the chemical industry's unit labor costs fell more slowly than they did for all manufacturing. In the first quarter, the annual decline for both groups was the same. The chief cause for concern is that chemicals' poor performance in relation to all manufacturing in productivity growth and in unit labor cost declines in the past has been a leading indicator for a slowdown or recession in the chemical economy.

One mitigating factor is the continuing long, slow growth of both the chemical industry and the economy in general in the current ex-

Second-quarter chemical productivity plateaued after first-quarter jump . . .

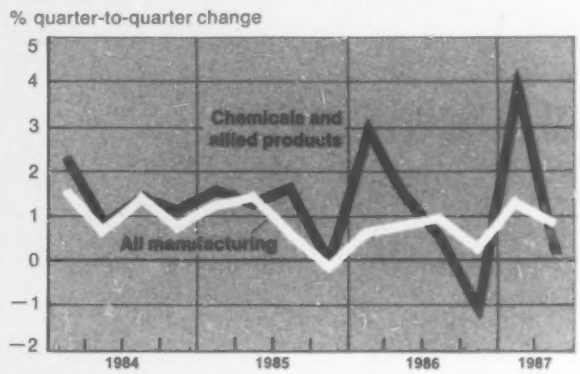
Indexes, 1977 = 100	Quarters, 1987		Quarters, 1986				Quarters, 1985				Quarter, 1984
	2nd	1st	4th	3rd	2nd	1st	4th	3rd	2nd	1st	4th
CHEMICALS AND ALLIED PRODUCTS											
Production	138.2	137.8	133.6	134.1	132.8	131.8	127.9	128.1	126.9	125.8	127.9
Workhours	93.5	93.2	94.2	93.4	93.1	93.4	93.8	93.9	94.5	95.1	94.9
Productivity	147.9	147.8	141.9	143.6	142.7	140.6	136.3	136.4	134.1	132.3	130.2
Hourly production wages	191.0	189.8	188.8	186.9	184.8	184.1	183.9	180.7	178.6	177.3	176.5
Unit labor costs	129.1	128.4	133.1	130.2	129.5	130.9	134.9	132.5	133.1	134.1	135.5
ALL MANUFACTURING											
Production	133.0	131.8	130.4	129.4	128.4	128.4	127.4	126.8	126.3	125.3	124.9
Workhours	92.8	92.8	93.1	92.6	92.8	93.6	93.5	92.9	93.0	93.8	94.6
Productivity	143.3	142.0	140.1	139.7	138.3	137.3	136.3	136.5	135.6	133.7	132.0
Hourly production wages	173.8	173.2	172.1	171.0	170.8	170.5	169.4	167.8	167.0	163.6	163.8
Unit labor costs	121.3	121.9	122.9	122.4	123.5	124.2	124.3	122.9	123.2	122.4	124.1

. . . but first-half 1937 is up markedly from 1986 average

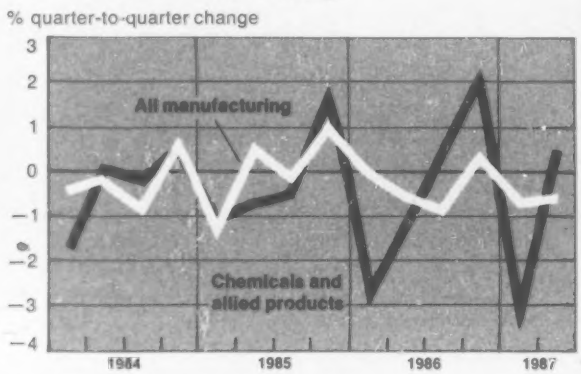
Indexes, 1977 = 100	1987*	1986	1985	1984	1983	1982	1981	1980	1979	1978	1977
CHEMICALS AND ALLIED PRODUCTS											
Production	138.0	132.9	127.1	121.6	113.9	103.8	112.6	106.4	113.3	106.3	100.0
Workhours	93.4	93.5	94.3	95.0	93.9	95.2	101.7	101.0	103.1	102.2	100.0
Productivity	147.9	142.1	134.8	128.0	121.3	109.0	110.7	105.4	109.9	104.0	100.0
Hourly production wages	190.4	186.1	180.1	172.7	164.8	155.0	141.8	129.2	118.2	109.2	100.0
Unit labor costs	128.8	130.9	133.7	135.0	135.9	142.2	128.2	122.6	107.6	105.0	100.0
ALL MANUFACTURING											
Production	132.4	129.2	126.4	123.4	113.9	102.2	110.5	108.2	110.7	106.1	100.0
Workhours	92.8	93.0	93.3	94.8	88.2	87.0	97.9	98.9	106.2	104.5	100.0
Productivity	142.7	138.9	135.5	130.1	124.8	117.5	112.9	109.4	104.2	101.5	100.0
Hourly production wages	173.5	171.1	166.9	161.5	155.4	149.6	140.7	128.1	118.0	108.6	100.0
Unit labor costs	121.6	123.3	123.2	124.1	124.4	127.3	124.7	121.5	113.2	107.0	100.0

a First half. **Sources:** Federal Reserve Board, Department of Labor

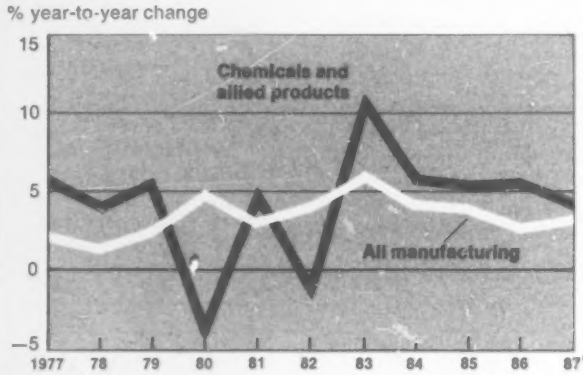
Second-quarter productivity gain for chemicals lagged all manufacturing . . .



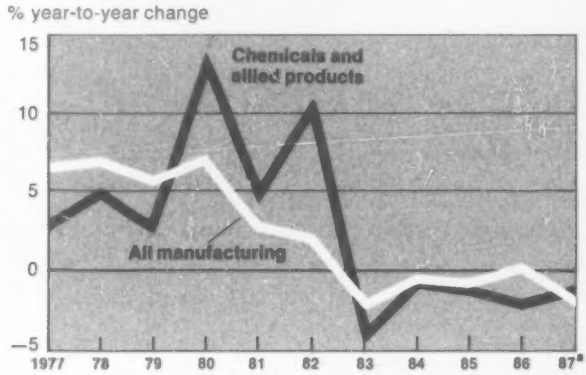
. . . and unit labor costs rose for chemicals but fell for manufacturing



Productivity rose faster for chemicals in the first half . . .



. . . but unit labor costs dropped less than for all manufacturing



Note: Productivity is output per workhour, calculated by dividing indexes for production by indexes for workhours of production employees. Unit labor costs are labor costs per unit of output, calculated by dividing indexes for wages by indexes for output per hour. a For first-half 1987, percentage change is from first-half 1986.
Sources: Department of Labor, Federal Reserve Board

pansion. This has led to an erratic pattern in chemical productivity for a number of quarters. In general, year-to-year improvement in productivity and unit labor costs has been pretty steady and gains have been substantial. However, quarter-to-quarter changes have shown swings in the amount of improvement in the past few years and have in the case of productivity even declined in a couple of quarters.

Using government data for production and workhours, C&EN estimates that chemical productivity in the second quarter of 1987 increased only 0.1% from the first quarter to an index of 147.9 (1977 = 100), but this figure was up 3.7% from the second quarter of 1986. For all manufacturing, productivity rose 0.9% on a quarter-to-quarter basis to an index of 143.3, and on an annual basis, it was up 3.6% from the comparable period in 1986.

For the first half of this year, productivity for chemicals and allied products grew 4.4% to an index of 147.9, whereas that for all manufacturing grew 3.5% to an index of 142.7.

In the second quarter, unit labor costs, which in good times are expected to decline, did indeed fall on an annual basis both for chemicals and for the broader manufacturing sector. But on a quarter-to-quarter basis, unit labor costs rose for chemicals for the third time in the past four quarters. This measure for chemicals and allied products was up 0.5% to an index of 129.1 in the second quarter of this year from the first quarter. On an annual basis, this measure declined a scant 0.3% from the same quarter a year ago—the smallest annual rate of decline since this measure began to fall at the beginning of 1983.

For all manufacturing, unit labor costs in the second quarter dropped 0.6% from the first quarter of 1987 to an index of 121.3. They are down 1.8% from the same period a year earlier.

For the first half of this year, unit labor costs for chemicals and allied products were down 1.1% to an index of 128.8 from the same period last year. However, the index for all manufacturing declined a more rapid 1.8% to an index of 121.6.

Chemical unit labor costs declined 1.6% in the first half of 1987 from the average for all of 1986, whereas productivity was up 4.1%. Unit labor costs for all manufacturing fell 1.4% from last year's average and productivity rose 2.7%. □

on this issue was fueled this spring by a report from the National Academy of Sciences that said there could be some risk to human health from residues, at the tolerance levels set by EPA, on both processed and unprocessed foods.

Groundwater contamination by pesticides is another serious concern, and the Senate bill takes a strong stance on the issue—too strong, according to NACA. It says the bill would essentially "establish a mandatory, universal nondegradation policy for nearly all groundwater. It does so by defining virtually all underground water as drinking water." The fear of polluting groundwater, even if it never would be used for drinking, NACA says, will deter farmers from using many agricultural chemicals. The House version is not that severe.

Another important section involves patent extension. Patent term extension, to allow a holder to recoup some of the patent life eaten up by regulatory review, is in the Senate bill, but not the House version. Generic pesticide manufacturers have floated the idea of allowing them to test generic products before a patent expires, a concept that has always been rejected before and could shorten the effective life of a patent by several years. Environmental groups are also making a strong plea for a provision permitting individuals to sue companies under FIFRA, an idea that is stiffly opposed by the pesticide industry.

David Hanson, Washington

Cost-benefit analysis of federal regulations

NEW ORLEANS

If federal agencies used more realistic risk and benefit estimates in determining what and how much to regulate, society as a whole would be much safer. And more benefits can be obtained, at less cost, from regulations that seek to ensure safety than from those that attempt to protect health.

Those are the admittedly "provocative" and "controversial" views of John F. Morrall III, an economist with the Office of Management & Budget. He presented results of his analyses of the costs and benefits of 44 federal health and safety rules at a symposium on risk assessment and the establishment of tolerances and standards for potentially toxic chemicals sponsored by the Division of Chemistry & the Law.

Morrall has reviewed health, safety, and environmental regulations for the executive office of the President during the past three Administrations. It is OMB's job, he explains, to obtain data from the scientific community and, working within the relevant legal parameters, to make recommendations on the cost-effectiveness of toxic chemical and safety regulations.

His analyses of the 44 regulations show that they vary enormously in cost effectiveness, from a cost of $100,000 per life saved for the National Highway Traffic Safety Administration's steering column standard to $72 billion per life saved for the Occupational Safety & Health Administration's worker exposure standard for formaldehyde.

For OSHA, the one agency that issues both safety and toxic chemical regulations, the median value of cost-per-life-saved estimates for seven safety rules in the analysis is 123 times higher than for six cancer regulations, Morrall notes, adding that even OSHA's most costly safety regulation—for grain dust—costs less per life saved than the least costly cancer regulation—for asbestos.

"On the basis of these data it can be concluded," Morrall says, "that with $1 billion in resources available for risk reduction, we could save 2000 lives through safety regulations or 27 lives through cancer regulations."

These differences between health and safety regulations should not be surprising, Morrall says. In large part, they are dictated by statute. The safety statutes, such as those authorizing NHTSA, the Consumer Product Safety Commission, or even OSHA's safety regulations, almost invariably speak in terms of reasonable, practicable, appropriate, and so forth, he notes. In contrast, the health statutes speak in terms of absolute or near absolute protection.

"Although these differences in cost-effectiveness may appear ex-

OSHA safety rules more cost-effective than health rules

Regulation	Status and year	Initial annual risk estimate[a]	Lives saved annually	Cost per life saved ($ thousands, 1984)
SAFETY				
Oil and gas well service	Proposed 1983	1.1 in 10^3	50.000	$ 100
Underground construction	Proposed 1983	1.6 in 10^3	8.100	300
Servicing wheel rims	Final 1984	1.4 in 10^5	2.300	500
Crane-suspended personnel platform	Proposed 1984	1.8 in 10^3	5.000	900
Concrete and masonry construction	Proposed 1985	1.4 in 10^5	6.500	1,400
Hazard communication	Final 1983	4.0 in 10^5	200.000	1,800
Grain dust	Proposed 1984	2.1 in 10^4	4.000	2,800
HEALTH				
Asbestos	Final 1972	3.9 in 10^4	396.000	7,400
Benzene	Final 1987	8.8 in 10^4	3.800	17,100
Ethylene oxide	Final 1984	4.4 in 10^5	2.800	25,600
Acrylonitrile	Final 1978	9.4 in 10^4	6.900	37,600
Coke ovens	Final 1976	1.6 in 10^4	31.000	61,800
Asbestos	Final 1986	6.7 in 10^5	74.700	89,300
Arsenic	Final 1978	1.8 in 10^3	11.700	92,500
Ethylene dibromide	Proposed 1983	2.5 in 10^4	0.002	15,600,000
Formaldehyde	Proposed 1985	6.8 in 10^7	0.010	72,000,000

a Annual deaths per exposed population. **Source:** John F. Morall III

traordinary," Morrall says, "they are probably understated by a large margin." For example, cancer risks tend to be overestimated. Safety risks, on the other hand, are less likely to be overestimated because of the greater availability of safety data.

It's pretty well known that agencies, in dealing with health issues, provide upper-bound risk estimates that are very conservative. "It's easy to understand, on a case-by-case basis," says Morrall, "why an individual scientist or even an agency finds it personally or politically easier to provide upper-bound rather than best-risk estimates. But in the aggregate, this approach does more harm than good in the cause of making our society safer."

This is not to say that Morrall denies the need to regulate toxic chemicals. In fact, he believes that "we tend to overregulate specific chemicals or activities, but underregulate in terms of the total number of chemicals or activities. I think this is due to our political-legal process, which causes agencies not to begin regulating unless there is a probability of harm, but once harm is established to regulate too stringently."

The system, he contends, "has problems with the idea that a chemical we are only 50% sure is a carcinogen of potency x should be regulated at 50% the stringency of a sure carcinogen of potency x. Now we either don't regulate or regulate as though the probability were 100%."

According to Morrall, "This problem could be overcome if we truly used effective-value or most-likely risk assessment methodology. We are slowly moving in that direction," he says, "as the science of risk assessment and our understanding of the etiology of cancer advance. The recent incorporation of pharmacokinetic data into risk assessment methodology is a sign of that progress."

Janice Long, Washington

o-Trifluoromethylphenol | m-Trifluoromethylphenol | p-Trifluoromethylphenol

o-Fluorophenol | p-Fluorophenol | p-Fluoro-α-methyl styrene

o-Fluoroanisole | p-Fluoroanisole | p-Hydroxypropiophenone

o-Fluoroacetophenone | Dimethyl N-Cyano-Dithioiminocarbonate | m-Trifluoromethyl-bromobenzene

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U.S. defining stance on global CFC treaty

NEW ORLEANS

A final negotiating session on a draft treaty to freeze and then cut production of chlorofluorocarbons (CFCs) begins in Montreal this week. The draft treaty has been agreed to in principle by 31 nations, including the U.S., which has been represented by the Department of State and the Environmental Protection Agency.

The U.S. position has been that an immediate freeze on current production levels of certain CFCs, followed by an eventual 95% cut in the production of all CFCs is needed to protect the stratospheric ozone layer. As it is now written, the draft treaty calls for an immediate freeze of production levels and imports of several fully halogenated CFCs, followed by a 50% reduction in production of CFCs over the next eight to 10 years.

Although the treaty is expected to be signed at the Montreal meeting, some issues remain to be resolved. For example, the U.S. would like to see the treaty address the question of reducing production of halons, bromine-containing compounds used as fire retardants. There are also questions about how many producing countries must sign the treaty for it to take effect and possible trade restrictions against producing countries that do not sign the treaty.

Questions still remain, in fact, about what the U.S.'s position should be heading into this latest and perhaps final negotiating session. Early this summer reports surfaced that both the Department of Interior and the Office of Management & Budget questioned the draft treaty. Interior Secretary Donald Hodel, according to a spokesman, believed the draft treaty would be ineffective because too few countries and too few chemicals would be involved. And OMB questioned the costs and benefits of the draft treaty.